

Mapping Intellectual Structure of Student Well-Being, Literacy, and Numeracy in Primary Education in the 21st Century

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DOI: 10.12928/cece.v3i2.2268

Received: June 22nd, 2026. Revised: July 5th, 2026. Accepted: August 16th, 2026

Available Online: August 18th, 2026. Published Regularly: July 31th, 2025

ABSTRACT

The increasing complexity of educational systems has intensified interest in understanding the relationships among student well-being, literacy, and numeracy in primary education. While literacy and numeracy are recognized as essential competencies for lifelong learning, growing evidence indicates that students' psychological, emotional, and social well-being plays a critical role in shaping academic achievement and learning outcomes. Despite the expanding literature, a comprehensive overview of the intellectual structure and thematic evolution of this research area remains limited. To address this gap, this study conducted a bibliometric analysis of global research on student well-being, literacy, and numeracy in primary education using 144 Scopus-indexed publications published between 2011 and 2026. Data were analyzed using the Bibliometrix R Package and Biblioshiny, combining performance analysis and science mapping techniques, including publication trends, citation patterns, author productivity, source impact, institutional contributions, international collaboration, keyword co-occurrence, thematic evolution, co-citation networks, and bibliographic coupling. The results reveal a rapidly growing field with an annual growth rate of 21.25%. Australia emerged as the leading contributor, while Positive Psychology, Self-Determination Theory, Social-Emotional Learning, and school mental health formed the principal intellectual foundations. Thematic development demonstrates a transition from general well-being studies toward integrated investigations connecting psychological well-being with literacy achievement, numeracy development, educational resilience, and digital learning environments. Emerging research directions include digital well-being, learning analytics, and artificial intelligence in education. Based on these findings, the study proposes a Well-Being-Literacy-Numeracy Ecosystem Framework, positioning student well-being as a fundamental mechanism supporting literacy and numeracy development and promoting holistic educational success in primary education.

Keywords: bibliometric, literacy, numeracy, primary education, student well-being



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INTRODUCTION

The twenty-first century has witnessed a significant transformation in the way educational success is conceptualized and evaluated. Traditionally, educational systems emphasized academic achievement, particularly literacy and numeracy performance, as the primary indicators of educational effectiveness. However, contemporary educational discourse increasingly recognizes that academic outcomes alone are insufficient to capture the broader purposes of education [1] Educational systems are now expected to develop learners who are not only academically competent but also psychologically resilient, socially connected, emotionally healthy, and capable of lifelong learning (Prinsloo & Krause-Alzaidi, 2023; Sari et al., 2024). This shift is reflected in major international frameworks, including the United Nations Sustainable Development Goal 4 (SDG 4), the OECD Learning Compass 2030, and UNESCO's Future of Education initiative, all of which emphasize holistic development and well-being as essential educational outcomes [2]

Within this evolving context, student well-being has emerged as a central concern among researchers, policymakers, and practitioners. Student well-being generally refers to the quality of students' psychological, emotional, social, and educational experiences within learning environments. It encompasses positive emotional functioning, life satisfaction, school connectedness, supportive relationships, engagement in learning, and the capacity to cope with challenges. Increasing attention to student well-being is closely associated with growing concerns regarding the mental health of children and adolescents worldwide. Rising levels of anxiety, stress, loneliness, and emotional difficulties, particularly following the COVID-19 pandemic, have highlighted the need for educational systems that support both psychological well-being and academic achievement. Consequently, understanding how schools can promote student well-being while maintaining educational quality has become a major research priority.

Primary education occupies a particularly important position in this discussion. Early educational experiences establish the foundations for future academic, social, emotional, and behavioral development. Research consistently demonstrates that experiences during the primary school years significantly influence subsequent educational trajectories, learning engagement, psychological adjustment, and lifelong learning outcomes. Therefore, fostering student well-being during these formative years is increasingly viewed as a strategic investment capable of generating long-term benefits for both individuals and educational systems.

Alongside the growing emphasis on well-being, literacy and numeracy remain fundamental indicators of educational quality. Literacy extends beyond basic reading and writing skills to include the ability to access, interpret, evaluate, and communicate information effectively across diverse contexts. Similarly, numeracy encompasses not only mathematical competence but also the ability to apply quantitative reasoning to solve real-world problems. Together, these competencies form the foundation for participation in contemporary society, economic productivity, and lifelong learning. International assessment programs such as PISA, TIMSS, and PIRLS continue to emphasize their importance while revealing substantial disparities in learning outcomes across countries and educational systems.

Traditionally, literacy and numeracy achievement have been explained primarily through cognitive abilities, instructional quality, curriculum design, and assessment practices. However, accumulating evidence suggests that academic performance is also shaped by psychological, emotional, and social factors. Students' motivation, self-regulation, resilience, emotional engagement, school connectedness, and overall well-being significantly influence their capacity to participate effectively in learning processes. Learners who experience positive emotions and supportive educational environments are more likely to demonstrate persistence, concentration, and academic engagement, whereas psychological distress may hinder learning by reducing motivation and limiting participation. These findings suggest that literacy and

numeracy development cannot be fully understood without considering students' broader well-being experiences.

As a result, scholarly interest in the relationship between student well-being and foundational learning competencies has increased substantially over the past decade. Researchers increasingly investigate how psychological well-being influences literacy acquisition, reading achievement, numeracy development, mathematical reasoning, and overall academic performance. The growing convergence of these research domains reflects an emerging recognition that educational success results from complex interactions among cognitive, emotional, motivational, and contextual factors rather than from academic processes alone.

The development of this field has been strongly influenced by several complementary theoretical perspectives. Positive Psychology has shifted attention from deficit-oriented approaches toward strengths, flourishing, resilience, and optimal human functioning. Self-Determination Theory emphasizes the importance of autonomy, competence, and relatedness in fostering motivation, engagement, and well-being. Similarly, Social-Emotional Learning (SEL) highlights emotional regulation, self-awareness, interpersonal competence, and responsible decision-making as key factors supporting both well-being and academic achievement. In addition, Ecological Systems Theory emphasizes that learning and development occur within interconnected systems involving families, schools, peers, and communities. Collectively, these perspectives provide a strong theoretical foundation for understanding the interrelationships among student well-being, literacy, and numeracy.

The rapid expansion of digital technologies has further transformed educational experiences. Educational technology, online learning environments, learning analytics, and artificial intelligence are increasingly integrated into primary education. While these innovations create opportunities for personalized learning and improved educational access, they also introduce challenges related to digital well-being, screen exposure, online engagement, and educational inequality. Consequently, contemporary research increasingly examines how technological environments influence both student well-being and foundational learning outcomes. The emergence of digital well-being as a growing research theme reflects the evolving nature of educational challenges in the digital era.

Despite substantial growth in the literature, research on student well-being, literacy, and numeracy remains fragmented across multiple disciplines, including education, psychology, child development, public health, and educational technology. Existing reviews often examine these domains separately, limiting understanding of their intellectual convergence and interdependence. Furthermore, most reviews focus on synthesizing empirical findings rather than exploring the broader intellectual structure and thematic development of the field.

Previous bibliometric studies have examined these research domains separately. Obeidat *et al.* [3], for instance, conducted a bibliometric mapping of student well-being and school climate, focusing on the development and intellectual structure of research in this area. In the literacy domain, Farokhah *et al.* [4] examined research trends in mathematics literacy in elementary education, while Widiawati *et al.* [5] mapped research on numeracy literacy in primary education. Similarly, Kurike *et al.* [6] examined the bibliometric landscape of early literacy development in primary schools. In addition, Sagarduy *et al.* [7] mapped research on mathematics anxiety in primary education, representing an affective dimension closely related to students' mathematical learning experiences. Collectively, these studies provide valuable insights into individual components of the present research domain; however, their analytical scopes remain largely domain-specific. To the best of our knowledge, few bibliometric studies have systematically integrated student well-being, literacy, and numeracy within a single framework focused on primary education. The present study therefore addresses this gap by

mapping the publication trends, intellectual and conceptual structures, thematic evolution, and emerging research directions at the intersection of these three domains. These limitations have become increasingly apparent as emerging topics such as digital learning, artificial intelligence, learning analytics, and post-pandemic educational recovery reshape research priorities.

Addressing these gaps is important because a clearer understanding of the evolution of this research field can inform educational policies and interventions aimed at simultaneously improving student well-being and foundational learning outcomes. Bibliometric analysis provides a powerful methodological approach for achieving this objective by systematically mapping scientific production, citation patterns, collaboration networks, intellectual structures, thematic evolution, and emerging research fronts. Unlike traditional literature reviews, bibliometric techniques enable researchers to identify hidden patterns within large bodies of literature and provide a comprehensive overview of knowledge development.

Therefore, this study conducts a comprehensive bibliometric analysis of global research on student well-being, literacy, and numeracy in primary education published between 2011 and 2026. Specifically, the study examines publication trends, influential contributors, intellectual and conceptual structures, thematic evolution, and future research directions. This study contributes to the literature in three ways. First, it provides the first comprehensive bibliometric mapping of research integrating student well-being, literacy, and numeracy within primary education. To the best of our knowledge, no previous bibliometric study has simultaneously examined student well-being, literacy, and numeracy within primary education. Existing reviews have focused on these domains separately, leaving the intellectual convergence among them largely unexplored. Second, it identifies the intellectual convergence among Positive Psychology, Self-Determination Theory, Social-Emotional Learning, and foundational learning research. Third, it proposes a Well-Being-Literacy-Numeracy Ecosystem Framework that conceptualizes student well-being as a foundational mechanism supporting learning engagement, literacy development, numeracy achievement, and long-term educational success. Through these contributions, the study offers a comprehensive overview of the field and a strategic roadmap for future research, policy, and educational practice.

METHOD

This study employed a bibliometric research design [8], [9] to examine the scientific development, intellectual foundations, conceptual structure, and emerging trends of research on student well-being, literacy, and numeracy in primary education. Bibliometric analysis was selected because it provides a systematic, transparent, and reproducible approach for evaluating scientific productivity, citation impact, collaboration patterns, and thematic evolution within a research field [10]. Data were retrieved from the Scopus database, chosen for its extensive coverage of peer-reviewed journals and comprehensive bibliographic metadata. The search was conducted in June 2026 using the Scopus Advanced Search interface. The exact search query applied was: “TITLE-ABS-KEY (("student well-being" OR "student wellbeing") AND ("digital literacy" OR literacy OR numeracy OR technology OR "educational technology" OR "digital learning" OR education OR learning) AND ("primary school" OR "elementary school" OR "primary education" OR "elementary education"))”. The search strategy combined keywords related to student well-being, literacy, numeracy, and primary education using Boolean operators AND and OR. To maximize coverage, synonymous terms were incorporated, including *student well-being*, *student wellbeing*, *literacy*, *digital literacy*, *numeracy*, *technology*, *educational technology*, *digital learning*, *primary school*, *elementary school*, *primary education*, and *elementary education*.

Eligibility criteria were established prior to data collection. The study included English-language articles and review papers published in peer-reviewed journals between 2011 and

2026. Conference proceedings, editorials, notes, book chapters, duplicate records, and non-English publications were excluded. Only studies explicitly related to student well-being, literacy, numeracy, and primary education were retained.

The literature search and study selection process followed the PRISMA 2020 framework. The initial search in the Scopus database identified 172 records. Of these, 23 records were excluded because they did not meet the predefined document-type criteria, resulting in 149 articles. After removing three duplicate records, 146 articles remained for title and abstract screening. One article was subsequently excluded because it did not meet the predefined eligibility criteria. The remaining 145 articles underwent full-text assessment, during which one additional article was excluded because it failed to satisfy the inclusion criteria. Finally, 144 publications met all eligibility criteria and were included in the bibliometric analysis. The final dataset was then exported in CSV format for analysis. Prior to bibliometric analysis, the metadata were cleaned and standardized, author-name disambiguation, and institutional-affiliation harmonization to improve analytical reliability. The bibliometric workflow consisted of five stages in figure 1:

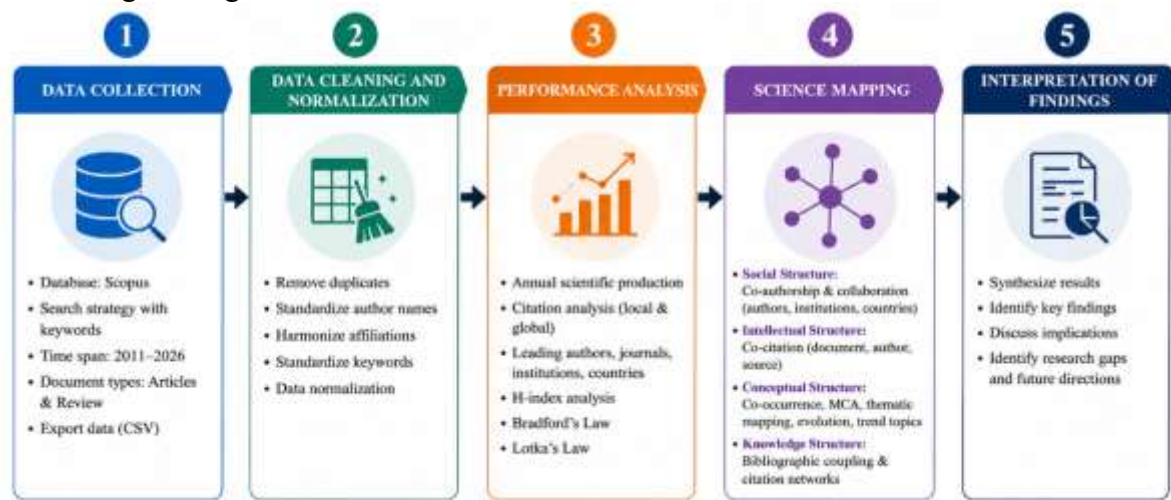


Figure 1. The bibliometric workflow

Performance analysis assessed annual scientific production, citation trends, leading authors, journals, institutions, and countries. Author influence was evaluated using the H-index, local citations, and global citations.

Science mapping was conducted to examine the social, intellectual, and conceptual structures of the field. Social structure analysis explored collaboration networks among authors, institutions, and countries through co-authorship mapping. Intellectual structure analysis employed author, document, and source co-citation analyses to identify influential studies and foundational knowledge bases. Conceptual structure analysis incorporated keyword co-occurrence networks, Multiple Correspondence Analysis (MCA), thematic mapping, thematic evolution, and trend-topic analysis to identify dominant themes, emerging topics, and shifts in research focus. Bibliographic coupling and citation network analyses were further used to reveal contemporary research fronts and knowledge evolution.

All analyses were performed using the Bibliometrix package (version 4.3) with *R* in June 2026, which provides an integrated environment for bibliometric performance analysis and science mapping. Methodological rigor was enhanced through the use of Scopus as a high-quality data source, systematic data cleaning procedures, established bibliometric indicators, and the integration of performance analysis with science mapping. This approach ensured the reliability, validity, and comprehensiveness of findings regarding the evolution and future directions of research on student well-being, literacy, and numeracy in primary education.

RESULTS AND DISCUSSION

Results

Main Information

The bibliometric dataset consists of 144 Scopus-indexed articles published between 2011 and 2026 across 112 academic sources, indicating the emergence of a rapidly expanding and increasingly interdisciplinary research field. Dataset in Table 1.

Table 1. Dataset

Description	Results
Timespan	2011–2026
Sources (Journals, Books, etc.)	112
Documents	144
Annual Growth Rate (%)	21.25
Average Document Age	2.95
Average Citations per Document	10.37
References	7,519
Authors	503
Author Keywords	541
Keywords Plus	321
Authors per Document	3.86
International Co-authorship (%)	18.75

The intellectual structure of the field is characterized by a relatively concentrated yet highly influential group of scholars. Authors such as Carr Vaughan J., Green Melissa J., Laurens Kristin R., Tzoumakis Stacy, and Williams Kate E. have emerged as leading contributors, each achieving a local H-index of four and maintaining sustained scholarly productivity throughout the period of rapid field expansion. Their contributions have significantly shaped theoretical perspectives, methodological approaches, and empirical investigations related to student well-being, mental health, school engagement, and educational achievement. Notably, the concentration of these influential scholars within Australian institutions underscores Australia's prominent role in establishing the conceptual foundations of the field. The findings further suggest that scholarly influence is driven not only by publication volume but also by theoretical innovation, citation impact, and participation in collaborative research networks.

Analysis of publication sources reveals a well-defined intellectual core within the field. Bradford's Law identifies approximately 18 highly productive journals that account for a substantial proportion of the scientific output. Among the most influential sources are *Frontiers in Education*, *Frontiers in Psychology*, *School Mental Health*, and *Children and Youth Services Review*. The prominence of these journals highlights the interdisciplinary nature of the field, situated at the intersection of education, psychology, child development, and public health. At the same time, the increasing visibility of journals focused on educational technology, digital learning, and positive education reflects the diversification of research interests and the emergence of new scholarly frontiers associated with technological transformation, educational resilience, and post-pandemic learning recovery in figure 2, below:

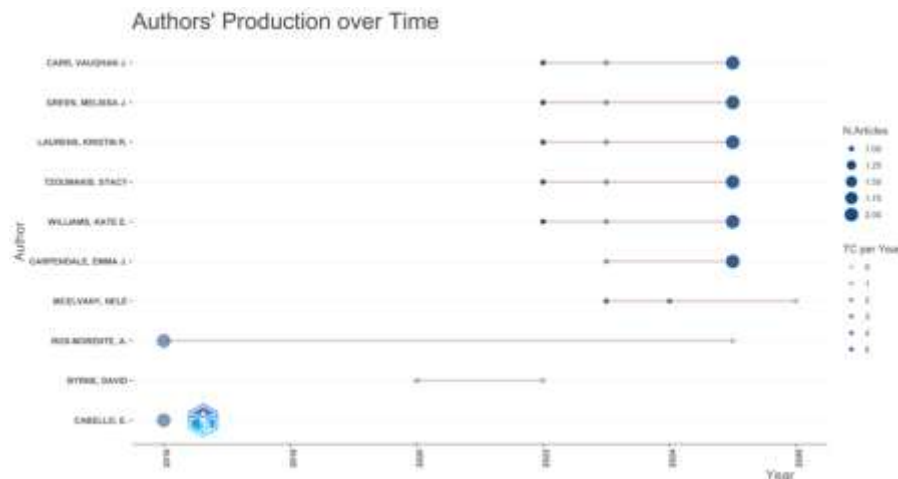


Figure 2. Most Relevant Sources

Institutional productivity analysis further demonstrates the existence of a concentrated yet influential research infrastructure. Australian universities, particularly Queensland University of Technology, Griffith University, Monash University, University of Newcastle, University of New South Wales, and Western Sydney University, function as major knowledge hubs within the global research landscape. Among these institutions, Queensland University of Technology exhibits the highest level of sustained productivity and scholarly influence. The dominance of these universities is likely supported by strong educational policies, extensive interdisciplinary collaborations, substantial research investments, and active engagement in longitudinal and intervention-based studies. Moreover, institutional productivity increased markedly after 2020, coinciding with heightened global concern regarding student mental health, educational disruption, resilience, and learning recovery following the COVID-19 pandemic. Collectively, these findings portray a mature and strategically significant field in which student well-being has evolved from a peripheral educational concern into a foundational determinant of literacy development, numeracy achievement, learning engagement, and long-term educational success in figure 3., below:

Annual Publication Trends

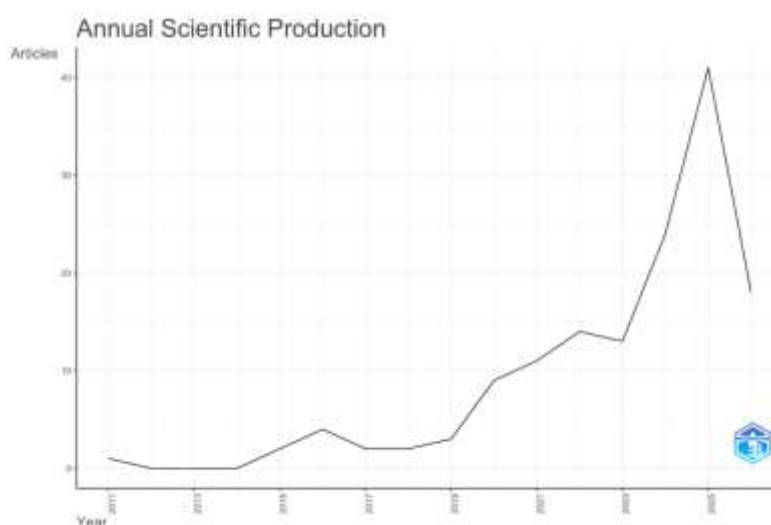


Figure 3. Annual Publication Trends

The analysis of annual publication trends demonstrates that research on student well-being, literacy, and numeracy in primary education has experienced substantial and sustained growth over the period 2011-2026, with an annual growth rate of 21.25%. This rapid expansion reflects increasing scholarly recognition of the interconnected roles of psychological well-being and foundational learning competencies in supporting holistic educational development. The publication trajectory reveals three distinct developmental phases. During the initial phase (2011-2016), research activity remained relatively limited and focused primarily on mental health, emotional well-being, psychological adjustment, and child development. At this stage, literacy and numeracy were largely treated as secondary educational outcomes rather than integral components of well-being-oriented educational frameworks.

The second phase (2017-2020) was characterized by steady growth and increasing conceptual diversification. Research attention expanded beyond psychological health to include themes such as resilience, school belonging, self-efficacy, school engagement, and social-emotional learning. This period marked an important transition toward a more integrated understanding of student development, in which academic achievement was increasingly linked to socio-emotional and motivational factors rather than being viewed solely through cognitive perspectives. Thematic evolution during this phase further illustrates the emergence of school well-being, social-emotional learning, and educational achievement as central research themes, reflecting a growing recognition that student well-being plays a critical role in shaping learning engagement and academic success.

The most significant expansion occurred during the third phase (2021–2026), when publication output increased exponentially and reached its peak in 2025. This acceleration coincided with heightened global concerns regarding student mental health, educational inequality, and learning disruptions caused by the COVID-19 pandemic. Consequently, research increasingly focused on understanding how well-being contributes to literacy acquisition, numeracy development, educational resilience, learning recovery, and school connectedness. The thematic evolution analysis indicates the emergence of a new research paradigm in which well-being is no longer viewed merely as an educational outcome but as a foundational mechanism supporting learning and academic development. The integration of literacy and numeracy into well-being research reflects a broader shift toward understanding educational success as the result of interactions among cognitive, emotional, social, and technological factors.

Citation patterns reinforce the growing influence of this research domain. Publications produced between 2016 and 2023 achieved the highest average citation impact, indicating that studies examining the relationship between well-being and educational outcomes have become increasingly influential within the broader educational research community. Furthermore, trend topic analysis highlights several rapidly emerging areas of scholarly attention, including educational resilience, school connectedness, digital well-being, learning analytics, and artificial intelligence in education. These themes suggest that future research will continue to integrate psychological, educational, and technological perspectives to better understand and support student learning and development. Overall, the annual publication trend reveals a significant paradigm shift from an achievement-centered perspective toward a holistic educational framework that positions student well-being as a central driver of literacy, numeracy, and long-term educational success.

Country/Region Analysis

Country and regional analysis reveals a highly uneven geographical distribution of scientific production within the field of student well-being, literacy, and numeracy. Australia emerges as the dominant contributor in terms of publication output, citation performance, and

institutional productivity, followed by the United States, the United Kingdom, Spain, the Netherlands, and China. Australia's leading position reflects a strong national commitment to positive education, school well-being, mental health promotion, and educational resilience, which has fostered a favorable environment for sustained research development. As a result, Australian scholars and institutions have played a central role in shaping both the intellectual and empirical foundations of the field. Nevertheless, citation patterns indicate a more diversified distribution of scientific influence, with countries such as the United States and China achieving citation impacts comparable to Australia despite producing fewer publications. This finding suggests that scholarly influence is becoming increasingly globalized and is no longer concentrated exclusively within a single geographical region in Figure 4.

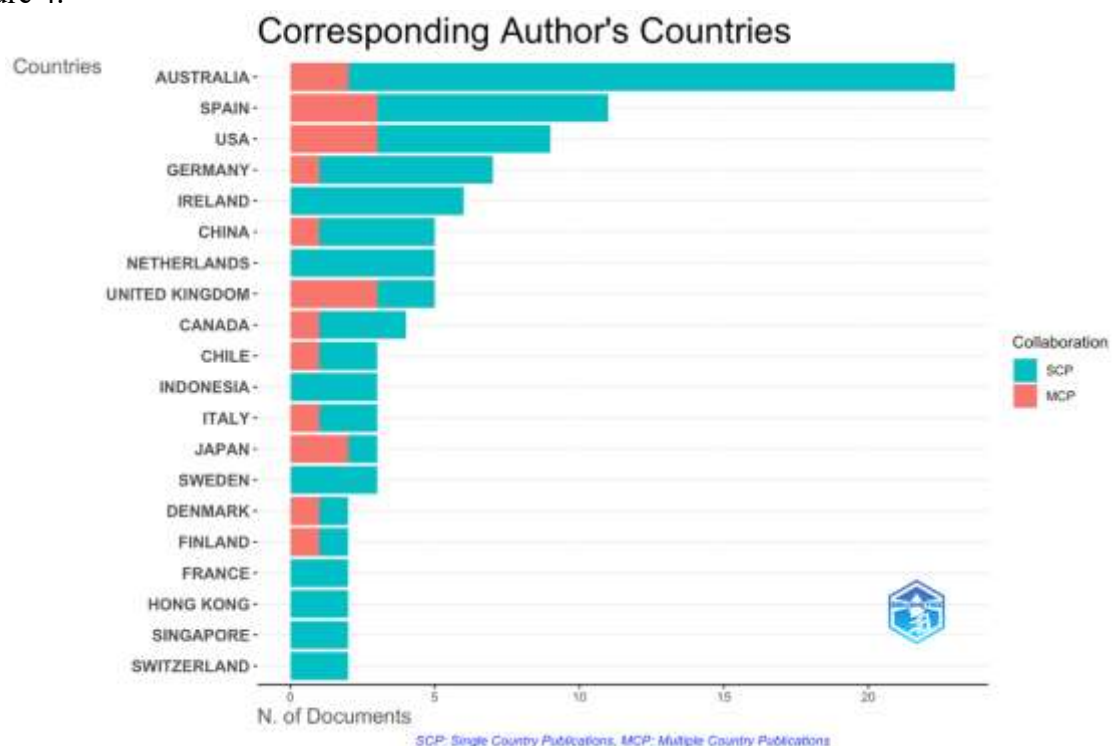


Figure 4. Country Collaboration Map

The international collaboration network further demonstrates the growing globalization of research activity, characterized by increasing cross-national partnerships and knowledge exchange. Australia occupies a strategic position within the collaboration network, functioning as a major hub that connects researchers across multiple regions and facilitates the dissemination of knowledge. However, despite the expansion of international collaboration, significant geographical inequalities remain evident. Research partnerships are predominantly concentrated among high-income countries, while low- and middle-income regions continue to be underrepresented within the global knowledge network. In particular, Southeast Asia, Africa, and Latin America contribute relatively limited scientific output despite their considerable cultural, educational, and socioeconomic diversity. This imbalance raises concerns regarding the generalizability of existing theoretical frameworks and intervention models, which are largely derived from Western educational contexts. Consequently, the findings highlight a dual reality within the field: while international collaboration and scientific influence continue to expand across national boundaries, substantial opportunities remain for strengthening research capacity, promoting cross-cultural investigations, and developing a

more inclusive and globally representative understanding of the relationships among student well-being, literacy development, and numeracy achievement.

Keywords Analysis

The keyword co-occurrence network reveals four interconnected thematic clusters shaping research on student well-being, literacy, and numeracy. The dominant red cluster occupies the central position of the network and is characterized by keywords such as *student well-being*, *mental health*, *school well-being*, *learning*, and *resilience*, indicating that well-being functions as the primary conceptual hub linking diverse educational research domains. The blue cluster connects *students*, *schools*, demographic characteristics, and academic outcomes, reflecting the integration of literacy, numeracy, and educational achievement with learner-related factors. The green cluster highlights contextual and social dimensions of education, including school engagement, support systems, and learning environments, whereas the smaller peripheral purple cluster represents emerging or specialized topics with relatively limited integration into the broader field. Collectively, these clusters demonstrate a paradigm shift from viewing well-being, literacy, and numeracy as separate constructs toward understanding them as interconnected elements of a holistic educational ecosystem in Figure 5.

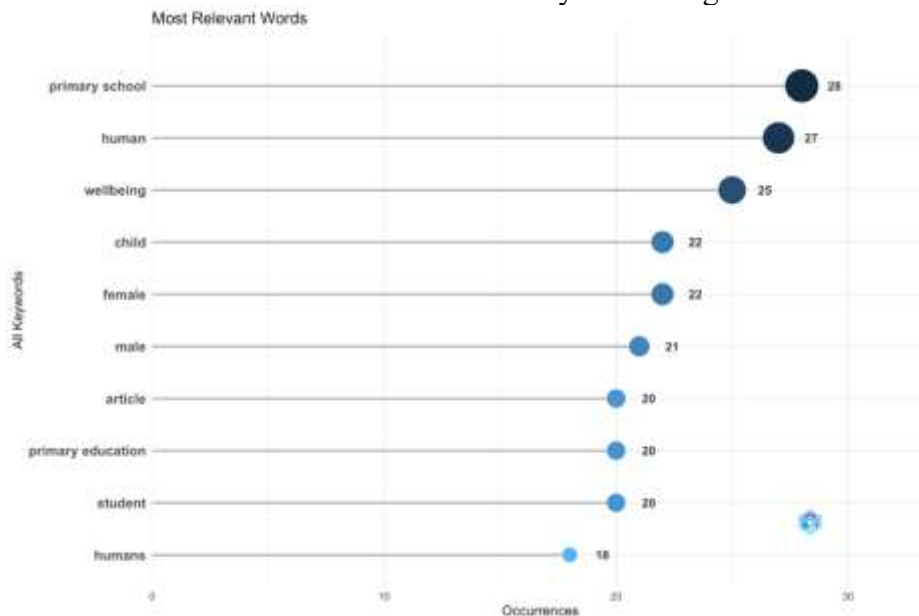


Figure 5. Layer visualization of keywords

The thematic map was interpreted using two bibliometric indicators: centrality and density. Centrality reflects the degree to which a theme is connected to the broader thematic structure, whereas density reflects the internal development and cohesion of a theme. Based on these indicators, themes were classified into four quadrants: motor themes, characterized by high centrality and high density; basic themes, characterized by high centrality and low density; niche themes, characterized by low centrality and high density; and emerging or declining themes, characterized by low centrality and low density.

The results indicate that student well-being, mental health, school engagement, positive education, and social-emotional learning are positioned in the motor-theme quadrant. Their relatively high centrality indicates strong connections with other themes in the research field, while their relatively high density indicates substantial internal development. These themes therefore represent well-developed and structurally important areas of the research landscape. Literacy and numeracy are positioned within the basic-theme quadrant, showing relatively high centrality but lower density. Their central position indicates strong connections with other

themes, while their lower density suggests that their internal conceptual development is comparatively less cohesive. Thus, literacy and numeracy function as foundational themes within the field while still offering opportunities for further theoretical development.

Digital well-being, educational resilience, learning recovery, online learning, and educational technology are positioned in the emerging/declining quadrant, characterized by relatively low centrality and density. Their position indicates that these themes have relatively limited integration with the broader thematic structure and remain less internally developed. Their interpretation as emerging themes should therefore be considered together with the thematic evolution and trend-topic results.

Emotional competence and conflict resolution are positioned in the niche-theme quadrant, characterized by relatively low centrality but high density. This indicates that these themes are internally developed within specialized research clusters but remain relatively peripheral to the broader research structure. Their niche position suggests potential opportunities to investigate their connections with the central themes of student well-being, literacy, and numeracy in Figure 6.

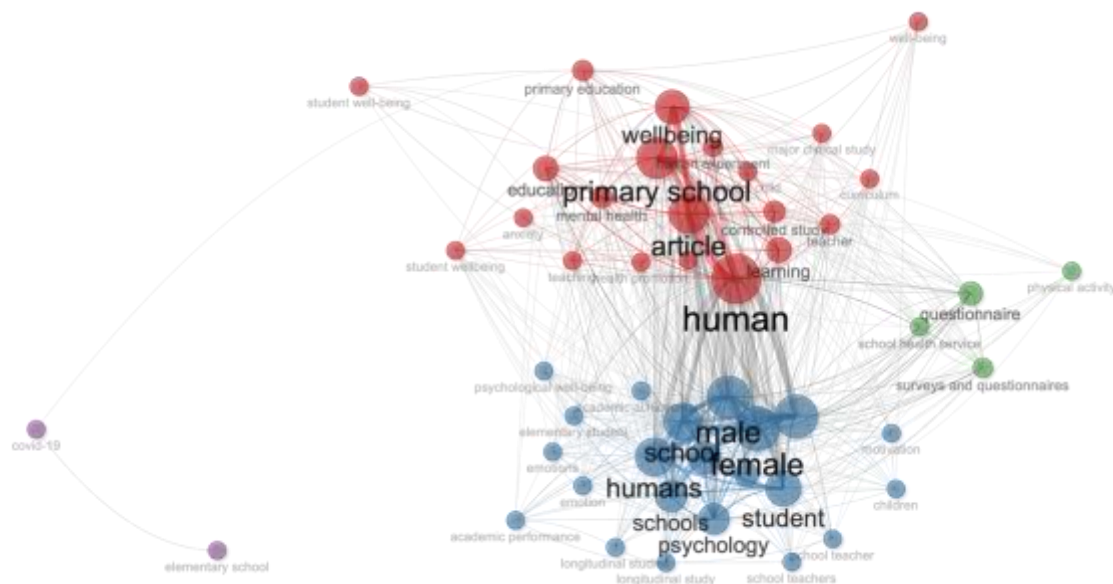


Figure 6. Layer visualization of keywords

Consistent with the MCA results, the field is organized around three overarching domains: (1) psychological well-being and human flourishing, encompassing well-being, mental health, resilience, and life satisfaction; (2) literacy, numeracy, and academic development, including reading achievement, mathematical competence, and academic performance; and (3) educational ecosystems, characterized by school climate, teacher support, family engagement, and school connectedness. Co-citation and bibliographic coupling analyses further show that the intellectual foundations of the field are rooted in Positive Psychology, Self-Determination Theory, and Social-Emotional Learning. Current research frontiers increasingly focus on school mental health and achievement, literacy-well-being relationships, numeracy resilience, and digital well-being in technology-enhanced learning environments. Together, these findings reinforce the central role of student well-being as a key mechanism linking psychological, academic, and contextual factors in educational success.

Discussion

The bibliometric findings indicate an increasing integration of student well-being with research on literacy, numeracy, and learning outcomes. The publication trends and thematic patterns suggest that recent studies increasingly address psychological, emotional, and social dimensions alongside academic competencies [11], [12]. Historically, educational effectiveness has been primarily measured through literacy and numeracy outcomes (Abella et al., 2024; Chang, 2023). However, the literature over the past decade has shown that academic success is inseparable from students' psychological [15], emotional [16], and social well-being [17], [18]. The growth in publications after 2020 is also accompanied by increased attention to student mental health, learning recovery, and holistic educational development. These patterns describe the changing focus of the research literature rather than establishing a causal relationship between student well-being and academic achievement.

The bibliometric results further reveal a strong conceptual connection between student well-being and literacy and numeracy research. Literacy, previously understood as cognitive competency influenced by the quality of learning [19] and language skills, is now viewed as a process also influenced by emotional engagement [20], school belonging [21], [22], learning motivation [23], [24], and psychological safety [25], [26], [27]. Similar findings are also seen in numeracy research, which increasingly emphasizes the importance of affective factors such as mathematics anxiety [28], [29], self-efficacy [30], [31], and mathematical resilience [32]. Thus, The literature represented in the bibliometric corpus increasingly associates literacy and numeracy with both cognitive and non-cognitive dimensions of students' learning experiences. This perspective strengthens the view that academic success is the result of a complex interaction between cognitive [33], [34] and non-cognitive dimensions.

The emergence of digital well-being as an increasingly visible research theme also reflects the changing technological context of education. The bibliometric analysis identifies themes related to educational technology, personalized learning [35], adaptive learning [36], [37], and data-driven learning [35], [38], [39]. However, these developments also pose new challenges, such as digital fatigue, increased screen exposure (Tripathi, 2026.; Zaen et al., 2025), attention deficit disorder [42], and the quality of student engagement in online learning environments [43]. Therefore, the development of educational technology needs to be evaluated not only in terms of learning effectiveness [44], [45], [46], [47], but also in terms of its impact on students' psychological well-being [48], [49]. These findings indicate that the issue of digital well-being will be a major agenda for educational research in the future.

These four perspectives collectively emphasize that literacy and numeracy development occurs within a complex educational ecosystem and is influenced by the interaction of psychological [50], [51], motivational [52], [53], and learning environmental factors [54], [55], [56], [57]. This theoretical synthesis led to the emergence of the Well-Being-Literacy-Numeracy Ecosystem perspective, which positions student well-being as a fundamental mechanism that drives learning engagement [58], [59], academic motivation [60], [61], and learning achievement [62]. Thus, student well-being is no longer seen as the end result of education, but rather as a strategic resource that enables the optimal development of academic competencies.

From a theoretical perspective, research results indicate a growing convergence between Positive Psychology, Self-Determination Theory, Social-Emotional Learning (SEL), and Ecological Systems Theory. The co-citation and conceptual analyses suggest that these perspectives constitute important intellectual foundations within the research landscape [63], [64], [65], [66]. At the school level, interventions that strengthen students' school connectedness [67], social-emotional competencies [68], [69], [70], and learning engagement need to be prioritized [71], [72], [73]. Meanwhile, teachers are required to develop learning

practices that are not only oriented towards academic achievement [74], but also pay attention to students' psychological and emotional needs [75], [76]. For researchers, these findings emphasize the importance of a multidisciplinary approach to understanding the complexity of the relationship between well-being [77], [78], literacy [1], [79], and numeracy [80], [81], [82]. Overall, the research results indicate that sustainable educational success can only be achieved through the integration of student well-being, the development of literacy and numeracy competencies, and the creation of a supportive learning ecosystem.

Nevertheless, several research gaps still require attention. Most studies still utilize fragmented theoretical perspectives and are dominated by cross-sectional research designs, thus preventing a comprehensive explanation of the causal link between well-being and academic achievement. Furthermore, knowledge production remains concentrated in developed countries, particularly Australia, the United States, the United Kingdom, and several European countries, while contributions from Southeast Asia, Africa, Latin America, and Pacific island countries remain relatively limited. Vulnerable student groups, such as people with disabilities, indigenous communities, refugee students, and low socioeconomic groups, are also underrepresented in the literature. Furthermore, developments in educational technology present new research opportunities related to artificial intelligence, learning analytics, adaptive learning systems, and digital well-being. Therefore, future research should prioritize longitudinal designs, mixed-methods approaches, cross-cultural validation, and exploration of the role of technology in supporting students' well-being and core competencies. Such approaches will enrich our understanding of how well-being can serve as a foundation for the development of inclusive and sustainable literacy, numeracy, and educational success.

CONCLUSION

This study provides a comprehensive bibliometric analysis of global research on student well-being, literacy, and numeracy in primary education between 2011 and 2026, based on 144 Scopus-indexed publications. The findings reveal a rapidly expanding research field, with an annual growth rate exceeding 21%, and demonstrate a clear evolution from early studies focused on psychological well-being and mental health toward integrated investigations of literacy achievement, numeracy development, digital learning, and educational resilience. Australia emerged as the leading contributor, supported by influential institutions and strong research networks. Intellectual and conceptual structure analyses identified Positive Psychology, Self-Determination Theory, Social-Emotional Learning, and Ecological Systems Theory as the principal theoretical foundations, collectively supporting a holistic perspective in which well-being and academic achievement are mutually reinforcing.

Thematic evolution and bibliographic coupling analyses further indicate a paradigm shift, positioning student well-being not merely as an educational outcome but as a foundational mechanism influencing literacy and numeracy development. Emerging themes such as digital well-being, learning analytics, educational resilience, and artificial intelligence highlight the growing influence of technological transformation on educational research. The study contributes theoretically by proposing a Well-Being-Literacy-Numeracy Ecosystem Framework that conceptualizes educational success as the result of interactions among psychological, academic, social, and technological dimensions. Methodologically, it demonstrates the value of integrating performance analysis and science mapping techniques to uncover the intellectual and conceptual structure of the field. Although limited to Scopus-indexed English-language publications, the findings provide important insights into the evolution of this research domain. Future studies should expand database coverage and strengthen cross-cultural and interdisciplinary investigations. Overall, the results suggest that

advancing student well-being alongside literacy and numeracy development is essential for achieving holistic and sustainable educational success in primary education.

CONFLICT OF INTEREST

The authors declare no conflict of interest. The authors affirm that there are no financial, personal, institutional, or professional relationships that could have influenced the design, implementation, analysis, interpretation, or reporting of this research. All authors have contributed to the manuscript objectively and independently in accordance with academic and ethical standards.

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